REMARKS / ARGUMENTS

I. General Remarks and Disposition of the Claims

Please consider the application in view of the following remarks. Applicants thank the Examiner for his careful consideration of this application.

Claims 1-5, 10-14, 21, 24-29, 100-106, 108-127, and 129-149 are pending in this application. Claims 1-5, 10-14, 21, 24-29, 100-106, 108-127, and 129-149 are rejected. Claims 2, 108, 129, 146 and 148 have been canceled. Claims 1, 4, 11-114, 24, 26, 29, 101-106, 110, 113-119, 121-123, 127, 131, 134-140, and 142-144 have been amended herein. Claims 150-154 have been added herein. These amendments are supported by the specification as filed. All the amendments are made in a good faith effort to advance the prosecution on the merits of this case. It should not be assumed that the amendments made herein were made for reasons related to patentability. Applicants respectfully request that the above amendments be entered and further request reconsideration in light of the amendments and remarks contained herein.

II. Remarks Regarding Rejections Under 35 U.S.C. § 103

Claims 1-5, 10-14, 21, 24-29, 100-106, 108-127, and 129-149 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,532,052 issued to Weaver et al. (hereinafter "*Weaver*") in view of U.S. Patent No. 3,271,307 issued to Dickson et al. (hereinafter "*Dickson*"). With respect to this rejection, the Final Office Action states:

> Weaver was discussed previously in item 6 in OA and the arguments and grounds of rejection are repeated herein for Applicant's convenience.
>
> Weaver discloses a method for fracturing, and/or diverting fluids within, a subterranean formation to substantially alter the fluid flow (permeability) and/or surface characteristics of the formation, said method including injecting into the formation an aqueous composition that can alter the properties of organic/aqueous fluids, said composition containing a branched water-soluble organic polymer containing unit(s), having a molecular weight of 900 to 50,000,000, that can be hydrophilic, hydrophobic or a combination thereof, and can further include a gelling agent and/or a proppant. (Abstract; col. 5, lines 1-10 and 30-65; col. 6, lines 29-65; col. 7, lines 7-33; col. 9, lines 32-37 and 49-63; col. 20, lines 65 to col. 21, line 6; col. 21, lines 49-63; col. 38, lines 37-51; col. 39, lines 24-36; *See particularly*, col. 8, lines 41-67; *See also*, Table 6 on col. 53-54 disclosing data of aqueous fluid diverting and water permeability reduction properties for an aqueous fluid containing a

methoxypolyethylene oxide branched polydimethylaminoethyl methacrylate copolymer, sand, silica flour and bentonite)

For example, an exemplary polymer disclosed in Weaver for treating subterranean oil producing formations has a cationic hydrophilic backbone modified with hydrophobic branches providing a desired hydrophobic-hydrophilic within the formation, thus altering the surface characteristic of the formation and the fluid flow or resistance to flow relative to a particular fluid, wherein the hydrophilic nature of the branched polymer serves as an aqueous gelling agent that provides for an increase in fluid viscosity. (Col. 5, lines 11-16; col. 6, lines 65 to col. 7, line 40; col. 7, lines 63 to col. 8, lines 21; col. 10, lines 56-59; Table on col. 9-10) In Tables 23-28, Weaver discloses data for examples of treating a well by injecting into the well an aqueous solution containing a cationic polymer with nonionic branches.

Weaver discloses that the water-soluble branched polymer can have, in its backbone chain and/or in its branch chain, one or more heteroatom or groups, such as nitrogen, oxygen, phosphorous, sulfur, sulfur groups, amide, carboxyamide and carbonyl. (Col. 14, lines 17-23 and 52-59) The polymer units in either chain can be -R-X-, wherein R is a C_1 to C_6 alkyl radical and X represents a heteroatom and are preferably capped. (Col. 19, lines 36-65) Particularly, branched polymers containing polyamine and polyether linkages in the branches are preferred for altering fluid flow properties in the formation and are especially effective and stable at temperatures above 177°C. (Col. 13, lines 1-18)

Among the monomers disclosed in Weaver that can be used to form the branched polymer include dimethylaminoethyl methacrylate, acrylic esters, acrylamide, epichlorohydrin and chloroprene; wherein the polymeric unit/group can be derived from, e.g., saccharide or a derivative thereof (including cellulose and starch), vinyl, diallylic, amide or ether monomeric units, as long as it has the desired hydrophilic-hydrophobic property. (Col. 19, lines 7-10; col. 19, lines 66 to col. 20, lines 29; col. 22, lines 47-65) The vinyl or diene polymer units are represented by (Class I, structure on col. 23); the amine type polymer units (Class III, structure on col. 24-25); the amide type polymer units (Class IV, structure on col. 25); whereas the saccharide and saccharide derivative units (Class V) are represented by the chemical structure depicted on col. 25-26, lines 43-59. (*See also*, the examples of class V on col. 35-36).

Weaver further discloses that a preferred class of polymers for altering aqueous fluid properties, such as altering water-oil ratio in a formation process and enhancing oil production, are polymers containing 2-hydroxylpropyl N,N dialkyl-amine as backbone units

and acrylamide (organic acid derivative) and/or epichlorohydrin reacted polyalkoxide as the branch units. (Col. 42, lines 31-37) In Procedure O beginning on col. 50, lines 5, Weaver discloses an example of altering the permeability of a formation surface (change in water-oil ratio) by injecting into the formation a copolymer of polydimethylaminoethyl methacrylate (PDMAEM having MW of 1 million) grafted with a polyethylene oxide branch (PEO, MW of 15,000). The resulting data showing reduction in water permeability of the formation is shown in Tables 7 and 8. (*See also* Tables 10-13 on col. 57-59 for permeability data of an aqueous treating solution containing 1% of a hydrophilic PDMAEM polymer (MW of 600-800K) branched with a hydrophobic methoxy-polyethylene glycol epichlorohydrin (MPEO) adduct; particularly, polymer #7 of Table 10). In Tables 14-15 on col. 59, Weaver further discloses PDMAEM:PEO/MPEO weight ratios for the branched polymer ranging from 0.5:1.0 to 1.25 to 0.25.

Regarding the limitation in independent claims 1, 106 and 127 concerning the hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation to an aqueous-based fluid, Weaver discloses results demonstrating reduction in water permeability in the same examples containing the modified polymer discussed above (immediately preceding paragraph) in Tables 10-13 and 14-14 on col. 57-60. (*See, e.g.,* Sample #7 on Table 10, showing a reduction in water permeability of 85%)

Finally, regarding the limitation in claim 125 concerning "metering" the RPM into an injection stream comprising the aqueous injection fluid, in the absence of guidance from the specification, the term "metering" has been given its broadest interpretation as another term for "providing" the RPM to the well via injection, which is encompassed by Weaver as discussed above.

However, Weaver does not expressly disclose the RPM to have the alkyl branch recited in claim 1, as amended.

On the other hand, Dickson teaches branched polyalkylene polyamines used as oil well treatment composition additives (e.g., as demulsifiers or corrosion inhibitors), said branched polyamines having a polyamine base (or derivative thereof) hydrophilic polymer and an alkylene branch that can be butylenes and other homologs, straight-chained or branched. (Col. 1, lines 13-50; col. 2, lines 16 to col. 3, line 5) These compounds can undergo acylation (to form, e.g., acrylate or methacrylate derivatives) or be reacted with an alkenyl succinic acid derivative (col. 3, lines 50-68; col. 5, lines 8-55; col. 6, lines 43-73); and/or they can undergo

> alkylation/oxyalkylation with e.g., an alkylating agent, butylenes oxide or octylene oxide, or (col. 10, lines 1-16; col. 15, lines 56-66; col. 19, liens 25-59; col. 24, liens 39-53; Table II; Examples 1-3).
>
> Dickson further teaches that these branched compounds have numerous uses in processes involving water flooding in a subterranean formation and have advantages, such as not forming precipitates, good anti-corrosion properties and having strong bactericidal action. (Col. 31, lines 72 to col. 32, lines 39)
>
> Therefore, it would have been obvious to a person of ordinary skill in the art at the time that the invention was made to use the branched polyamine compounds as the hydrophobically modified hydrophilic polymer injected in Weaver's method of treating a subterranean formation. It would have been obvious for one skilled in the art to do so to attain a more cost-effective oil treatment method using a resultant aqueous fluid having the enhanced anti-corrosion, bactericidal and non-precipitation properties taught by Dickson, and thus efficiently attain a desired level of surface permeability of the subterranean formation.
>
> Thus, the instant claims are unpatentable over Waver and Dickson

(Final Office Action at 3-8.) Applicants respectfully disagree.

In order for a reference or combination of references to form the basis for a rejection under § 103(a), the reference or combination of references must teach or suggest all of the elements of the claim. *Weaver* in view of *Dickson* fails to teach or suggest all of the elements of these claims as currently amended.

With respect to independent claims 1, 106, and 127, *Weaver* fails to teach or suggest a method wherein a "hydrophobically modified water-soluble polymer reduces the permeability of the subterranean formation zone to aqueous-based fluids." Contrary to the Examiner's assertions, Tables 10-14 of the *Weaver* reference do not demonstrate a hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation. *See Weaver*, col. 57-60. In particular, as Applicants have previously noted, Sample No. 7 in Table 10 of *Weaver* is not a hydrophobically modified polymer, in that it does not have a hydrophobic branch. *See Weaver*, col. 57. Rather, the Examiner has incorrectly referred to the methoxy-polyethylene glycol branch of Sample No. 7 as a hydrophobic branch. *See Weaver*, col. 57. Applicants respectfully submit that such branches are water soluble hydrophilic. As such Applicants maintain that Tables 10-14 of Weaver fail to demonstrate a **hydrophobically** modified water-soluble polymer that reduces the permeability of the subterranean formation to

aqueous-based fluids, but rather these Tables demonstrate that permeability reduction can be achieved by utilizing polymers with **hydrophilic** branches. *See Weaver*, col. 57-60. Furthermore, as Applicants have also previously noted, *Weaver* teaches that branched polymers containing a hydrophobic modifying portion function to **increase** water permeability. *See Weaver*, col. 7, lines 43-52. Thus Applicants assert that *Weaver* fails to teach or suggest this element.

However, regardless of the deficiencies of *Weaver*, the Examiner is apparently relying on *Dickson* to supply the claimed hydrophobically modified polymer. As the Examiner stated in the Final Office Action, "Weaver does not expressly disclose the RPM to have the alkyl branch recited in claim 1, as amended." (Final Office Action at 7.) Rather, the Examiner states, "it would have been obvious to a person of ordinary skill in the art at the time that the invention was made to use the branched polyamine compounds [of *Dickson*] as the hydrophobically modified hydrophilic polymer injected in Weaver's method." (Final Office Action at 7.) Despite the Examiner's reliance on *Dickson*, Applicants respectfully submit that *Dickson* does not disclose or suggest the claimed hydrophobically modified polymer.

First, *Dickson* fails to teach or suggest a hydrophobically modified water-soluble polymer that "has a **molecular weight in the range of about 100,000 to about 10,000,000**," as recited in independent claims 1, 106, and 127. Rather, *Dickson* teaches branched polyalkylene polyamines that have a molecular weight below the claimed range. *Dickson*, col. 2, line 16 to col. 3, line 5. For example, the branched polyalkylene polyamines of *Dickson* are expressed by the formulas in column 2. *Id.* In these formulas, the number of repeating units for the polyamine is limited to between 4 to 24, clearly indicating that the polyamines do not have the claimed molecular weight. *Dickson*, col. 2, line 16 to col. 3, line 5. To the extent that *Dickson* may teach increasing the molecular weight of these polymers, Applicants respectfully submit that *Dickson* does not disclose increasing the molecular weight of the disclosed polymers to achieve the claimed molecular weight of 100,000 to 10,000,000. As such, *Dickson* does not teach or suggest hydrophobically modified water soluble polymers with molecular weights in the claimed range of about 100,000 to about 10,000,000.

Second, *Dickson* fails to teach or suggest a hydrophobically modified water-soluble polymer that "comprises a polymer backbone, a dialkyl amino pendant group, and a hydrophobic branch," as recited in independent claim 106 Rather, *Dickson* teaches branched

polyalkylene polyamines that do not comprise a dialkyl amino pendant group. *See Dickson*, col. 1, line 13 to line 50; col. 2, line 16 to col. 3, line 5. As such, *Dickson* does not teach or suggest hydrophobically modified water soluble polymers that comprise the claimed dialkyl amino pendant group.

Accordingly, *Weaver* in view of *Dickson* fails to teach or suggest each and every limitation of independent claims 1, 106, and 127. In addition, no motivation or other apparent reason known to a person of skill in the art has been provided to modify the cited references to produce the claimed invention. *See* KSR International Co. v. Teleflex, Inc., 550 U.S. __ (2007) (slip op., at 14).

Therefore, Applicants respectfully assert that independent claims 1, 106, and 127 are not obviated by *Weaver* in view of *Dickson*. Moreover, claims 2-5, 10, 14, 21, 24-29, 100-105, 108-126, and 129-149 depend, either directly or indirectly, from independent claims 1, 106, and 127. All these dependent claims include all the limitations of the independent claims from which they depend on, and thus are allowable for at least the reasons cited above with respect to independent claims 1, 106, and 127. *See* 35 U.S.C. § 112 ¶ (2004). Applicants thus request withdrawal of this rejection.

III. Allowable Subject Matter

In the Final Office Action, the Examiner noted that "[c]laim 1 would be allowable if rewritten to limit the hydrophilic polymer to contain the chitosan species that was previously examined." (Final Office Action at 8.) Applicants gratefully acknowledge the Examiner's indication that claim 1 would be allowable if rewritten to limit the hydrophilic polymer to contain the chitosan species. Since Applicants have traversed the rejections of claim 1, as currently amended, Applicants respectfully submit that claim 1, as presented herein, is allowable.

IV. Remarks Regarding New Claims

Applicants respectfully submit that claims 150-154 are allowable. Claims 150-154 depend directly or indirectly from independent claims 1, 106, and 127, which Applicants have demonstrated are allowable in Section II above. These dependent claims contain all of the limitations of the independent claims they depend on, and thus are allowable for at least the same reasons. *See* 35 U.S.C. § 112 ¶ 4 (2004). In addition, these claims are also allowable for the subject matter that they separately recite. For example, claims 150 and 151 each recite that the "hydrophobically modified water-soluble polymer comprises a dialkyl amino pendant group,"

which as discussed in Section III above is not disclosed by *Weaver* in view of *Dickson*. Therefore, Applicants respectfully request the timely issuance of a Notice of Allowance for these claims.

V. No Waiver

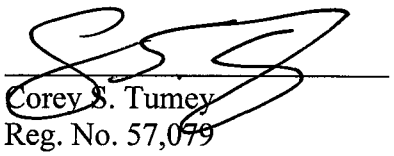
All of Applicants' arguments and amendments are without prejudice or disclaimer. Additionally, Applicants have merely discussed example distinctions from the cited references. Other distinctions may exist, and Applicants reserve the right to discuss these additional distinctions in a later Response or on Appeal, if appropriate. By not responding to additional statements made by the Examiner, Applicants do not acquiesce to the Examiner's additional statements, such as, for example, any statements relating to what would be obvious to a person of ordinary skill in the art.

SUMMARY

In light of the above remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Should the Examiner have any questions, comments, or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or electronic mail.

Applicants have authorized the Commissioner to debit the amount of $810.00 for the RCE fee of $810.00 under 37 C.F.R. § 1.117(e) from the Deposit Account of Baker Botts L.L.P. (No. 02-0383, Order Number 063718.0331) that was provided via the Office's electronic filing system. Should the Commissioner deem that any additional fees are due, including any fees for extension of time, Applicants respectfully request that the Commissioner accept this as a petition therefor, and direct that any additional fees be charged to the Deposit Account of Baker Botts L.L.P. (No. 02-0383, Order Number 063718.0331).

Respectfully submitted,



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